

# Keyboard Controller

## Background of the Invention

## Field of the Invention

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The present invention relates to a keyboard controller. More precisely, the keyboard controller can parse all the received keyboard controller commands/data before they are processed. After parsed, the received commands/data will be sent to the pure hardware processing unit or the firmware/micro-controller unit. This mechanism, therefore, can reduce the complexity of the firmware and the loading of the micro-controller. It also can improve the processing capability and flexibility of the keyboard controller.

## 15 Description of the Prior Art

Conventionally, a keyboard controller is usually implemented by a micro-controller which with the firmware embedded. In other words, all the data and commands received need to be processed by the firmware which embedded in the micro-controller. Therefore, the complexity and code size of the firmware was increased in order to process all the possible types of commands/data.

Another conventional keyboard controller was implemented with the pure hardware circuitry. In other words, all the commands/data received were processed by the pure hardware unit, that means, no firmware was needed. Since this keyboard controller does not require the firmware/micro-controller unit to process commands or data, it enhances the processing efficiency. However, this

kind of keyboard controller is less flexible when processing the commands/data  
According to the above description, the present invention is to overcome the  
mentioned problems. The present invention is to provide a keyboard controller.  
More precisely, it is a keyboard controller with a command parsing circuit  
5 circuitry After commands/data are parsed, it would be sent to the pure hardware  
circuitry or the firmware/micro-controller unit. As a result, the commands and  
data can be efficiently processed without the help of firmware. Furthermore, the  
flexibility was also reserved since the present of the firmware/micro-controller  
unit.

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### **3. Summary of the Invention**

The object of the present invention is to provide a keyboard controller for  
enhancing processing capability and flexibility. Furthermore, the present invention  
15 reduces the complexity of the firmware needed for a keyboard. While the  
commands of the keyboard controller are sent from the host via 64h and 60h of  
input/output ports, the data will be parsed first, and then are sent to the pure  
hardware circuitry or a micro-controller for reducing the complexity of the  
firmware needed.

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Another object of the present invention is to provide a keyboard controller, which  
can reduce the loading of the micro-controller. The micro-controller only needs to  
process the extended commands or those standard commands which needs extra  
operation. As a result, only those commands/data which really need to be  
25 processed by firmware are sent to the firmware/micro-controller unit, so the  
loading of the micro-controller is reduced since most of the commands/data are

processed by the pure hardware circuitry. Further, it improves processing capability and enhances processing flexibility.

#### 4. Brief Description of the Drawings

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The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention. In the drawings,

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Figure 1 is a simplified embodiment according to the present invention.

#### 5. Detailed Description of the Preferred Embodiments

15 The present invention relates to a keyboard controller. More precisely, the keyboard controller can parse all the data and commands. Further, the parsed commands and data are processed by the pure hardware unit or the firmware/micro-controller. This, therefore, can reduce the complexity of the firmware of the keyboard controller. By using the present invention, the provided  
20 keyboard controller can also enhance flexibility for processing the keyboard controller commands.

Referring to Figure 1, it is a simplified embodiment according to present invention. The processing flow chart of the present invention can be understood as shown in Figure 1. The keyboard controller 200 includes a computer host  
25 interface 210. The host interface can receive or send out the data or commands. A command filtering circuitry 220 is also included for parsing the received

commands and data. The parsed commands/data will be sent to a pure hardware processing unit 240 or a firmware/micro-controller unit 230. A PS/2 interface circuitry 250 is included, which can send the received data and commands to PS/2 controller 300. The keyboard controller 200 can process the received  
5 commands/data by the pure hardware processing circuitry or the firmware/micro-controller unit. The received data or the commands are parsed by a command filtering circuitry, and then, sent to the pure hardware processing circuitry 230 or the micro-controller 240. The mechanism will enhance processing performance and also reserve the processing flexibility since the  
10 firmware/micro-controller still presents.

More, the provided keyboard controller 200 in present invention can reduce the loading of the micro-controller 240. In other words, the micro-controller 240 only needs to process extended commands or standard commands which need  
15 extra-operation. The received commands/data will be parsed first before they are processed. Only those commands/data which need to be processed by the micro-controller will be sent the firmware/micro-controller unit. This, therefore, reduces the loading of the micro-controller.

20 In addition, the command filtering circuitry 220 contains multiple controlled switches. Each switch can be used for determining where the corresponding command is sent to, either a pure hardware circuit or a micro-controller which with firmware embedded. For the further description in the command filter circuit 220, the command filter circuit 220 can parse the received keyboard controller  
25 commands/data. While the commands/data are standard, the commands/data would be sent to the pure hardware circuitry 230. By contrast, if the

commands/data are not standard, the commands/data would be sent to the micro-controller unit 240.

In addition, the command filtering circuitry 200 parses the multiple data or  
5 commands. Each kind of data or commands has its corresponding controlled switch. The referenced data and commands of the command filtering circuitry 220 corresponding to switches for determining if the command or data are sent to either a pure hardware unit or a micro-controller unit for further process. For example, an A-status data or command is at off-status as well as a zero of a logical  
10 signal, the A-status data would be sent to a pure hardware circuitry 230. Otherwise, the A-status data or commands would be sent to the micro-controller unit 240. Moreover, the processing steps of the keyboard controller 200 comprise: Receiving the signal which is processed from the PS/2 controller 300 by the data/command of the computer host 100. Then, sending the signal to the host  
15 interface 210 of the keyboard controller 200. Next, the signal would be sent to the command filtering circuitry 220. Parsing the assigned signal of the host interface 210 is also included. If the corresponding switch of the signal is at off-status, the signal would be sent to the pure hardware circuitry 230. Otherwise, the signal would be sent to the micro-controller 240. The pure hardware circuitry 230 and  
20 the micro-controller unit 240 send the signal to the PS/2 interface circuitry 250. The PS/2 interface circuitry 250 contains a communication terminal of the PS/2 controller, which can collect the data or commands. Then, it sends command/data to the PS/2 controller 300 for implement in computer. The keyboard controller 200 can connect the command/data of the computer host 100 and the PS/2  
25 controller 300 without using complicated programming analysis of the firmware to implement. As a result, it can reduce the complexity of the firmware

programming to alternate the traditional keyboard controller.

Further, while the computer host receiving the command/data of PS/2 controller 300 to return the signal, the PS/2 controller returns the signal to the keyboard  
5 controller. When the multiple data or controlled commands of the returned signal are standard commands, the signal would be sent to the pure hardware circuitry 230. Otherwise, the signal would be sent to the micro-controller unit 240. After that, the signal would be sent to the command filtering circuitry 220 for processing analysis. Then, it sends command/data to the host interface 210. The  
10 host interface 210 received the processed command of the PS/2 controller for returning to computer host. The keyboard controller 200 can connect the computer host and the PS/2 controller 300, and can process the signal without using firmware analysis for implement.

15 Accordingly, no matter the signal is data or a controlled command, it would be parsed through a command filtering circuitry. Then, the data/command would be sent to the pure hardware circuitry or a micro-controller unit. Similarly, while PS/2 interface circuitry receiving command or data, it goes through the pure hardware circuitry or the micro-controlled unit. Then, after parsing through the  
20 command filtering circuitry, it returns to the computer host.

In conclusion, the present invention meets novelty, improvement, and is applicable to the industry. It therefore meets the essential elements in patentability. There is no doubt that the present invention is legal to apply to the patent, and  
25 indeed we hope that this application can be granted as a patent.

While the invention has been described in terms of what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention needs not be limited to the disclosed embodiment. On the contrary, it is intended to cover various modifications and similar arrangements included within  
5 the spirit and scope of the appended claims while which are to be accord with the broadest interpretation so as to encompass all such modifications and similar structures.